## Welcome to Albion School of Physics and Mathematics: Intellectual Club

#### WELCOME BACK!

The goal of this session is to have fun playing games to introduce basic mathematical concepts. Mathematical jokes and games often rely on patterns, numbers, and logic, and through them, we can develop better problem-solving skills while enjoying the process.

## Move 2 matches to get 5 squares



## Move 2 matches to get 5 squares



### Move one match to get correct equality



### Move one match to get correct equality



# Solving the puzzles

- What strategies do you use when solving matchstick puzzles?
- Do you look for patterns first or just start moving sticks?
- Some matchstick puzzles have more than one solution!

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# Solving the puzzles

• Can we think of more?



## What's your favourite number and why?

• My favourite number: I am a three-digit number. My tens digit is five more than my ones digit, and my hundreds digit is eight less than my tens digit. What number am I?

Answer: 194

- What are the different ways we can describe your favourite numbers?
  - Even & Odd: Even numbers are divisible by 2, odd numbers are not.
  - Positive & Negative
  - Natural, Integer & Rational: Natural numbers are the positives, integers include 0 and negatives, rational numbers can be fractions

## **Probability revision**

- In probability an outcome that is certain to happen has a probability of 1, and one that's impossible a probability of
- Probabilities greater than 1 or less than 0 have no meaning
- An event is something that happens: throwing a die,

 $P(A) = \frac{Number \ of \ times \ A \ occurs}{Total \ number \ of \ possible \ outcomes}$ 

## Probability problem

 $P(A) = {Number of times A occurs \over Total number of possible outcomes}$ 

#### Task 1: A Bag of Marbles

A bag contains **5 red, 3 blue, and 2 green marbles**. A marble is drawn at random.

1.What is the probability of drawing a **red** marble?

2. What is the probability of **not** drawing a blue marble?

## More on probability

 The probability of an event happening is equal to 1 minus the probability of the event not happening

#### Task 2: A Bag of Marbles

A bag contains **5 red, 3 blue, and 2 green marbles**. A marble is drawn at random.

1. What is the probability of **not** drawing a **red** marble?

2.What is the probability of drawing a **blue** marble?

# Mutually exclusive and independent events

- Mutually exclusive events: two events that are impossible to happen at the same time
- Example: Rolling a 5 and a 6 at the same time
- Independent events: two events that can both happen but each has no influence on the outcome of the other
- Example: Rolling a 6 on one die and a 6 on the second die

## Empty glasses

#### **Empty Glasses**

I have five glasses in a row. The first three are full and the other two empty. How can I arrange them so that they are alternately full and empty, by moving only *one* glass?



#### **Empty Glasses**

Pick up the second glass from the left, pour its contents into the fifth glass, and replace the second glass.

## Extracting the cherry

#### **Extracting the Cherry**

This puzzle is a golden oldie, with a simple but elusive answer.

The cocktail cherry is inside the glass, which is formed from four matches. Your task is to move at most two of the matches, so that the cherry is then outside the glass. You can turn the glass sideways or upside down if you wish, but the shape must remain the same.



Move two matches to extract the cherry.



# thank you

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